

REMARKS

Claims 1-32, 38, and 39 are pending. Claims 1-32, 38, and 39 are rejected under 35 U.S.C. § 112. Claims 1, 2, 4-10, 12-18, 20-26, and 28-32 are rejected under 35 U.S.C. § 102(b) as being anticipated by Yanaka, et al., U.S. Patent No. 6,467,034 (hereinafter “Yanaka”). Claims 3, 11, 19, and 27 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Yanaka in view of U.S. Patent Publication No. 2002/0143999 to Yamagami (hereinafter “Yamagami”). Claims 38 and 39 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Yanaka in view of the IBM Global Services article entitled “Leveraging New Storage Technology for A Competitive Advantage” (hereinafter “IBM”) and further in view of Applicant’s admitted prior art (hereinafter “AAPA”).

Claims 1-3, 5-11, 13-19, 21-27, 29-32, and 38 have been amended to more particularly point out the features of the present invention. The amendments are fully supported by the specification, drawings, and claims. No additional claims have been cancelled. No new claims have been added. No new matter has been added.

REJECTIONS UNDER 35 U.S.C. §102(b)

The Office Action rejected Claims 1, 2, 4-10, 12-18, 20-26, and 28-32 under 35 U.S.C. §102(b) as being anticipated by Yanaka. As discussed in the telephone interview, the Applicants respectfully traverse this rejection in view of the amendments included herein. As agreed in the telephone interview, the amendments included herein likely overcome the art of record including Yanaka.

“Anticipation under 35 U.S.C. §102 requires the disclosure in a single piece of prior art of each and every limitation of a claimed invention. ...Whether such art is anticipating is a question of fact.” *Apple Computer, Inc. v. Articulate Systems, Inc.* 234 F.3d 14, 20, 57 USPQ2d 1057, 1061 (Fed. Cir. 2000). It is well settled that under 35 U.S.C. §102 “an invention is anticipated if . . . all the claim limitations [are] shown in a single art prior art reference. Every element of the

claimed invention must be literally present, arranged as in the claim. The identical invention must be shown in as complete detail as is contained in the patent claim.” *Richardson v. Suzuki Motor Co., Ltd.*, 9 U.S.P.Q.2d 1913, 1920 (Fed. Cir. 1989). Only if each limitation is literally disclosed by the prior art reference is the claim anticipated.

It may be useful to summarize the present invention and the prior art to better clarify the distinctions between them. First, Yanaka is directed to monitoring the ongoing status of a copy operation and adjusting data mirroring modes according to the ongoing performance and reliability of a storage system based on a number of commands waiting to be processed. See col. 9:9-35. Thus, no matter what type of data or application is being used, Yanaka teaches adjusting the mirroring mode of data based on system performance and wait times. Yanaka does not identify compatible copy functions for a particular data storage device, does not compare such functions to a copy policy associated with an application, and does not automatically select a copy function based on the comparison with the copy policy associated with the application.

Conversely, the present invention is directed toward enabling an application to have a predefined copy policy that specifies desired attributes of a copy function that will be used to handle the application’s data where the copy function is selected from a set of copy functions that are compatible with a target storage device. See Figure 11 for a comparison of copy function attributes with available copy policies and copy policy objectives. Thus, when the application performs a data copy request to copy data to a secondary storage device, the present invention identifies available copy functions that are compatible with the particular storage device. See p. 13, ¶ 46. The available copy functions may vary from one device to the next and may have different attributes from one another. Once the compatible copy functions are identified, the present invention allows for the attributes of the available copy functions to be compared to attributes of a copy policy associated with the application that made the request. See p. 13, ¶¶ 46-48. Then, the copy function that best satisfies the copy policy of the application is selected for use. The specification discloses several ways of determining the best copy function based on the copy policy of the application. See Figs. 7-10.

Claim 1

Claim 1 recites “an identification module configured to identify one or more available copy functions in response to a data copy request to copy data to a secondary storage device.” Thus, one or more copy functions are identified by the identification module **in response to a data copy request**. Yanaka fails to teach or suggest identifying one or more available copy functions and particularly fails to do so in response to a data copy request. This makes sense because Yanaka is not concerned with selecting compatible copy functions for an application, but is merely directed toward switching between different known mirroring modes based on a command load of a storage system. There is no need to identify the different mirroring modes, because the same three are always available and are always known independent of storage device and application. See Yanaka, col. 7, line 42 – col. 8, line 27 for a description of the three types of data mirroring modes taught in Yanaka and their functionality.

The Office Action states that Yanaka teaches the element of identifying one or more available copy functions in response to a data copy request at col. 7, lines 20-32, which describes a write activity detector that monitors the write requests and “when the activity has become larger than the range of an activity estimated in an operation mode at that point of time, it issues a signal to change over the mode to a mode making it possible to perform a data processing at a higher speed.” Contrary to the assertions of the Office Action, the cited portion of Yanaka, and Yanaka generally, does not teach or suggest **identifying one or more copy functions in response to a data copy request**. The Office Action states that “the write activity detector monitors the write requests **and identifies** if the present mode (i.e. synchronous, semi-synchronous or adaptice – the three predefined copy policies) is appropriate for the data transfer.” See Office Action, p. 5, ¶ 1. Applicants note that a teaching of “identifying” **if the present mode is appropriate** for the data transfer” is not the same as and does not anticipate the element of Claim 1 of **identifying one or more available copy functions**. Furthermore, the alleged “identification” in Yanaka is not performed **in response to a data copy request**, but is done based on a “range of an activity.”

Claim 1 further recites “the identification module identifying each identified copy function by determining that the copy function is available to an application to copy data of the data copy request to the secondary storage device.” Thus, Claim 1 explicitly recites that identification of a copy function is not related to determining if a “present mirroring mode is appropriate,” but identifies copy functions available to an application and determines if the copy function is compatible with a secondary storage device. Support for this amendment can be found in the specification on page 12, paragraph 40.

Furthermore, Claim 1 has been amended to recite “a comparison module configured to **compare one or more copy function attributes of each available copy function to corresponding copy policy objectives of a predefined copy policy.**” With regard to this element, the Office Action states that Yanaka discloses: “compar[ing] one or more attributes of each available copy function to corresponding attributes of a predefined copy policy” stating that “the write activity detector monitor compares the present mode with the predefined modes to determine if the amount of activity required at that time can be efficiently serviced” and cites column 7, lines 25-26 and column 5, line 61 through column 6, line 11 of Yanaka as evidence. Office Action at p.5.

Here, the Office Action seems to be asserting that the mirroring modes of Yanaka anticipate both the copy functions **and** copy policy recited in Claim 1. However, Applicants submit that the copy policy and copy policy objectives of Claim 1 are not the same as the copy functions and corresponding copy function attributes identified as compatible with a storage device. See Specification, Figure 11. Rather, the copy policy of the application is compared with available copy functions to determine a best fit. In order to make this distinction more clear, the claims have been amended throughout to refer to copy policy attributes instead as a copy policy objectives. Support for these amendments can be found in the specification at page 13, paragraph 46.

Further, Yanaka does not teach comparing copy function attributes of **each available copy function to corresponding policy objectives of a predefined copy policy.** The present application is directed to associating a copy policy with a particular application and then

comparing the copy policy objectives (e.g. recovery point objective, recovery time objective, location, etc) assigned to the data to the attributes of various available copy functions to determine which copy function most closely satisfies the requirements assigned to the data. This is a fundamentally different idea than monitoring a number of commands waiting to be processed and adjusting a mirroring mode accordingly as disclosed in Yanaka. The present invention allows for data of a particular application and storage device, for example, to be ensured greater reliability, while another application or storage device may require higher performance. Thus, the copy policy is associated with the requirements of the application and compared to copy functions compatible with a particular storage device to select the best available copy function, rather than simply changing mirroring modes in response to a backup of a commands in a command queue to increase efficiency.

Yanaka teaches that the write activity detector “monitors **activity** of a command received by the host controller A121, and when it recognizes that the activity has become larger than the range of an activity estimated in an operation mode at that point in time, it issues a signal to change over the mode to a mode making it possible to perform a data processing at a higher speed through the host controller A121.” Yanaka at col. 7, ll. 25-32. Applicants maintain the assertion that monitoring **activity** is not the same as comparing **attributes** of a copy policy with attributes of a copy function that include predefined values to determine which copy function should be used for the data. Activity relates to execution speed of a data copy request and amount of delay of unexecuted requests. Further, Applicants submit that Yanaka appears to be silent with regard to a predefined copy policy that includes copy policy objectives that correspond to predefined copy function attributes.

This concept is made clear as the write activity detector is further defined in Yanaka in column 9, lines 8-67. Yanaka teaches using predefined queue trigger points to change from one predefined copy mode to another. *Id.* at col. 9, ll. 8-67. Yanaka does not compare attributes with attributes, but instead compares performance metrics to predefined limits to shift from one copy mode to another. Even if a predefined limit of Yanaka is incorrectly assumed to be a predefined copy policy attribute, it is not compared to an attribute of a copy function comprising a

predefined value, but instead is compared to performance metrics measured within a processor or related hardware.

Amended Claim 1 recites that attributes of a copy function are compared to corresponding objectives in a predefined copy policy. This is a comparison of an attribute with a corresponding objective, and is not anticipated by the disclosure of monitoring a number of commands in a queue.

The Office Action also states that Yanaka discloses “a selection module configured to automatically select a copy function that satisfies the predefined copy policy based on the comparison of the copy function attributes to the corresponding attribute objectives of the copy policy” because it discloses that “the write activity issues a command to change the remote copy mode to another predefined mode that is most appropriate for the transfer” and cites column 7, lines 25-36 and column 5, line 71 through column 6, line 11 of Yanaka as evidence. Office Action at p. 6.

However, Applicants respectfully submit that Yanaka fails to teach automatically selecting a copy function that satisfies a predefined copy policy based on the comparison of the copy function attributes to the corresponding objectives of the copy policy as now recited in Claim 1. Applicants submit that issuing a command to change a copy mode based on performance metrics (e.g. command queue threshold) does not anticipate comparing copy policy attributes with copy function attributes as recited in Claim 1. A “queue state of commands waiting to be processed” as taught at column 9, line 16 is neither a copy policy attribute nor a function attribute. Rather, it is a system performance attribute.

Nevertheless, as discussed in the telephone interview and recommended by the examiner, the Applicants have amended Claim 1 to recite “the copy policy objectives comprising one or more of a recovery point objective, a recovery time objective, a location, a consistency, and an application impact.” Support for this amendment can be found in Figure 11 of the specification. As discussed in the telephone interview, Yanaka and the art of record is silent with regard to a copy policy with one or more of the listed copy policy objectives. See also below with regard to Claim 38. Thus, the Applicants respectfully assert that Yanaka fails to teach, disclose, or suggest

all of the limitations of amended Claim 1 as required under § 102. Therefore, Applicants submit that amended Claim 1 is in condition for immediate allowance.

Claims 9, 17, and 25

The Applicants respectfully assert that independent Claims 9, 17, 25, and 38 as amended are similar in scope to Claim 1 and that the arguments presented above for Claim 1 are equally applicable and therefore Claims 9, 17, 25, and 38 are allowable.

In addition, Applicants assert that Claims 2, 4-8, 10, 12-16, 18, 20-24, 26, and 28-32 are allowable because they depend from allowable claims. However, Applicants maintain that each of these claims includes subject matter that further distinguishes them over the prior art of record.

For example, Claim 2 recites “a policy generation module configured to read a set of required attributes from the application and to establish the predefined copy policy based on the set of required objectives from the application.” Thus, a set of objectives are provided by an application to generate a copy policy. The Office Action asserts that this element is taught in Yanaka at column 9, lines 8-36 where “the write activity detector bases its decision to change the mode based on attribute data from the host (i.e. number of commands, quantity of information, response time, access range, etc.).” However, such a teaching of the write activity detector basing its decision on monitoring a number of commands received from a host etc. in no way teaches or suggest reading a set of **required** objectives **from an application**.

Claim 4 recites “wherein the identification module is further configured to determine a set of copy functions compatible with the application, determine a set of copy functions compatible with a source storage device, where the data of the data request is stored, and the secondary storage device, and to determine available copy functions that are common to both the set of copy functions compatible with the application and the set of copy functions that are compatible with the source storage device and the secondary storage device.” Similar to the arguments above with regard to Claim 1, Yanaka fails to teach determining compatibility with the application and the storage device.

Claims 5-8 are directed toward determining best fit matches between a copy policy and a copy function and specifically recite particular calculations and comparisons to be made, none of which Applicants are able to find in the teachings of Yanaka, which is unconcerned with copy policies and the like.

REJECTION OF CLAIMS UNDER 35 U.S.C. §103(a)

The Office Action rejected Claims 3, 11, 19, and 27 under 35 U.S.C. § 103(a) as being unpatentable over Yanaka in view of Yamagami. Claims 38-39 are rejected as being unpatentable over Yanaka in view of IBM in view of AAPA. The Applicants respectfully traverse these rejections. The Applicants respectfully assert that Claims 3, 11, 19, 27, and 38-39 are in condition for allowance as depending from allowable Claims 1, 9, 17, and 25, because the art of record including Yanaka and Yamagami fails to teach or make obvious every element of independent Claims 1, 9, 17, and 25 as explained above.

Furthermore, Applicants note that Claim 38 recites numerous limitations not taught in Yanaka, IBM, or the AAPA. Claim 38 recites “Comparing one or more copy function attributes of each available copy function to corresponding copy policy objectives of the predefined copy policy, wherein the copy policy comprises a set of copy policy objectives that correspond to the copy function attributes of each copy function, **wherein the predefined copy policy attributes within the predefined copy policy comprise a recovery point objective (“RPO”), a recovery time objective (“RTO”), a distance to a secondary site where the secondary storage device is stored, a consistency, and an application impact, wherein an RPO comprises an amount of data lost over a period of time, wherein an RTO comprises an amount of time to recover data to a usable condition, wherein a consistency comprises a determination of dependency on other stored data, wherein an application impact comprises a performance impact caused by a copy function to the application, the performance impact measured in a unit of time.”**

The Office Action asserts that each of the bolded elements above are taught in IBM or the AAPA. IBM teaches the general ideas of the importance of data storage and how long data may not be available if down, but makes no teaching or suggestion of using such a limitation in a copy policy that is compared to copy function attributes for selecting a copy function. Further, the AAPA does mention the idea that data recovery requires an understanding of data dependency. However, these general ideas do not teach or suggest the specific limitations recited in Claim 38 wherein a predefined copy policy includes a recovery point objective attribute, a recovery time objective attribute, a distance to a secondary site attribute, and a consistency attribute, where the predefined copy policy is assigned to a particular data set and where it is compared to copy function attributes to select a best fit copy function.

Therefore, Applicants submit that Claim 38 is allowable over the prior art of record and request that the rejection of Claim 38 be withdrawn.

REMARKS

In view of the amendments and remarks included herein, Applicants submit that Claims 1-32 and 38-39 are in condition for prompt allowance. The Applicants have amended Claims 1-3, 5-11, 13-19, 21-27, 29-32, and 38. The Applicants are not conceding in this application that those claims are not patentable over the art cited by the Examiner, as the present claim amendments are only for facilitating expeditious prosecution of the allowable subject matter noted by the examiner. The Applicants respectfully reserve the right to pursue these and other claims in one or more continuations and/or divisional patent applications.

Should additional information be required, the Examiner is respectfully asked to notify the Applicants of such need. If any impediments to the prompt allowance of the claims can be resolved by a telephone conversation, the Examiner is respectfully requested to contact the undersigned.

Respectfully submitted,

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